IN THE CLAIMS:

Claims 2-5, 8, 10-13, 17, 18, 21-27, 31 and 34 (cancelled).

35. (new) A gravity gradient measuring system for use in an aircraft comprising:

(a) a gravity gradiometer for mounting in an aircraft;

(b) a coarse stage isolation mount for mounting in an aircraft for attenuating large displacements of the gradiometer relative to a flight path ideal to the measurement of gravity including:

(i) platform means;

(ii) translation stages supporting said platform means for movement along three orthogonal axes, whereby said translation stages isolate said platform means from low frequency, large displacements of the aircraft along any of said three orthogonal axes in response to turbulence, thereby minimizing the acceleration of said platform relative to inertial space;

(iii) rail means supporting said translation stages for movement along said three orthogonal axes;

(iv) drive means for moving said translation stages along said rail means; and

(v) first control means for determining the position of and controlling movement of said translation stages along said rail means; and

(c) a fine stage isolation mount carried by said platform means of the coarse stage isolation mount for supporting said gradiometer and

adapted to attenuate high frequency, small displacements of the gradiometer relative to an aircraft and consequently relative to a flight path ideal to the measurement of gravity gradients.

36. (new) The gravity gradient measuring system of claim 35 wherein said coarse stage isolation mount includes:

a first frame for fixedly mounting the coarse stage isolation mount on a floor of an aircraft;

first rails mounted on said first frame for extending parallel to a floor of an aircraft and defining one of said orthogonal axes;

a second frame movably mounted on first rails for movement along said one of said orthogonal axes;

second rails mounted on said second frame for extending parallel to a floor of an aircraft and perpendicular to said first rails and defining a second of said orthogonal axes;

a third frame movably mounted on said second rails for movement along said second orthogonal axis; and

third rails mounted on said third frame extending vertically with respect to an aircraft floor and hence perpendicular to said first rails and said second rails and defining a third of said orthogonal axes, said third rails movably supporting said platform means for movement along said third orthogonal axis.

37. (new) The system of claim 35, wherein said first control means determines and controls the position of said fine stage isolation mount relative to an

aircraft and consequently relative to a smoothed representation of a flight path of said aircraft.

38. (new) The system of claim 37, including an aircraft, wherein said coarse stage isolation mount is mounted in said aircraft and wherein said aircraft includes a navigation system and a flight control system, said flight control system and said navigation system interacting to control a flight path of said aircraft, said flight control system operable by at least one of a human pilot and an autopilot system.

39. (new) The system of claim 38, wherein said fine stage isolation mount includes second control means for determining and controlling the position of said gravity gradiometer in the six degrees of freedom associated with motion of a rigid body.

40. (new) The system of claim 38, wherein said second control means of said fine stage isolation mount directs said fine stage isolation mount towards a home position measured relative to the aircraft, whereby minimal accelerations are induced on the fine stage.

41. (new) The system of claim 35, wherein said fine stage isolation mount includes:

a base mounted on said platform means of said coarse stage isolation mount;

a floater magnetically levitated relative to said base, said floater supporting said gravity gradiometer;

a plurality of accelerometers adapted to measure said accelerations of said floater; and

a plurality of position sensors adapted to measure a relative position of said floater with respect to said base in the six degrees of freedom associated with motion of a rigid body.

42. (new) The system of claim 41, wherein said accelerometers are at least one of linear accelerometers and rotational accelerometers.

43. (new) A method for obtaining fine resolution gravity gradient data comprising:

transporting a gravity gradiometer on a fine stage isolation mount carried by a platform of a coarse stage isolation mount in an aircraft experiencing low and high frequency accelerations and displacements from a flight path ideal to the measurement of gravity gradient;

isolating, in a coarse stage, the gradiometer from said low frequency accelerations and corresponding displacements of the aircraft by sliding said platform and said fine stage isolation mount along three orthogonal axes relative to the aircraft in response to large displacements of the aircraft relative to said ideal flight path;

isolating, in a fine stage, the gradiometer from said high frequency accelerations and corresponding displacements by moving said fine stage isolation mount in response to small, high frequency displacements of the coarse stage platform relative to the aircraft and consequently relative to said ideal flight path;

tracking a position of said aircraft in the six degrees of freedom associated with motion of a rigid body;

during said isolating of said accelerations and displacements in said coarse and fine stages, measuring gravity gradients using a gravity gradiometer; and tabulating said gravity gradients as a function of said position of said aircraft.

44. (new) The method of claim 43, wherein said tracking comprises: identifying said position of said aircraft using at least one of an inertial navigation system and a global positioning system.

45. (new) The method of claim 44, wherein isolating of said accelerations and displacements in said coarse stage comprises:

measuring accelerations of said fine stage,

measuring the position of said fine stage relative to the aircraft; and

counteracting said accelerations and displacements measured through application of counteracting force to the coarse stage to move said platform and the fine stage isolation mount along one or more of said orthogonal axes.

46. (new) The method of claim 45, wherein isolating said accelerations and displacements in said fine stage comprises:

measuring accelerations of a floater carrying said gravity gradiometer and magnetically levitated relative to a base of said fine stage using electromagnets;

measuring the position of said floater relative to said base; and

compensating for said accelerations through variable application of current through said electromagnets.

47. (new) The method of claim 44, wherein isolating of said accelerations and displacements in said fine stage includes:

determining said position of said floater relative to said aircraft;

applying forces to said fine stage responsive to said position determined so as to reposition said floater towards a home position in, and relative to, said aircraft over a long time period, whereby minimum accelerations are induced on the fine stage.

48. (new) The method of claim 43, wherein said coarse stage isolates the gradiometer from accelerations having frequencies up to 1 Hz, and said fine stage isolates the gradiometer from accelerations above 1 Hz.